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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/926,377	12/13/2001	Thomas Grassl	GRAS3003/JEK	9840

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EXAMINER
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HOGANS, DAVID L

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 05/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/926,377

Applicant(s)

GRASSL, THOMAS

Examiner

David L. Hogans

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☒ Claim(s) 2-8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3. 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

This Office Action is in response to Pre-Amendment A filed on December 13, 2001.

#### *Status of Claims*

Claims 1-10 are pending.

#### *Claim Objections*

1. Claims 2-8 are objected to because of the following informalities: Claims 2-8 use the terms "front side" and "backside"; these relative terms bear no meaning absent a reference point, therefore, it is recommended that these terms be replaced so Claims 2-8 are not deemed indefinite. Appropriate correction is required.

#### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-8 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification fails to elucidate or generally describe how the integratable circuits, the electrically conductive contacts for vertical integration and the electrically conductive contacts of the integrated circuit are simultaneously formed. Merriam-Webster's Collegiate Dictionary (2001), Tenth Edition, defines simultaneous as "existing or occurring at the same time: exactly coincident". Since

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Applicant's specification, noting pages 2-4 and Figures 1a-1h, teach a process of steps in the formation of integratable circuits, electrically conductive contacts for vertical integration and electrically conductive contacts of the integrated circuit, and not simultaneous formation, as claimed by Claim 1, the Examiner deems the specification non-enabling.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by 5,426,072 to Finnila.

In reference to Claim 1, Finnila teaches:

- producing vertically integratable circuits comprising integratable circuits, electrically conductive contacts for vertical integration and electrically conductive contacts of the integrated circuit (See columns 3-5 and Figures 1-7)

In reference to Claims 2 and 8, Finnila teaches:

- forming insulation (13) at places of contact for vertical integration from a front side of a substrate bearing vertically integratable circuits (See column 2 lines 44-50 and Figure 2)

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- forming a gap (14b) within the insulation from the front side (See column 3 lines 49-55 and Figure 3)
- filling the gap with a electroconductive material from the front side (See columns 3-4 lines 55-05 and Figure 4)
- exposing the electroconductive material from the backside of the substrate bearing the vertically integratable circuits at the places of contact for vertical integration (See columns 4-5 lines 14-55 and Figures 5 and 6)
- applying electroconductive material from the backside to the previously exposed electric material at the places of contact for vertical integration (See columns 4-5 lines 14-55 and Figures 5 and 6)

In reference to Claim 3, Finnila teaches:

- thinning the substrate from the backside before exposure of the electroconductive material from the backside (See columns 4-5 lines 57-30 and Figures 5-6)

In reference to Claim 4, Finnila teaches:

- a SOI substrate wherein thinning is performed up to the insulating layer (See columns 4-5 lines 57-30 and Figures 5-6)

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over 5,426,072 to Finnila.

**Claim 5**

Incorporating all arguments of Claims 1, 2 and 3 and noting that Finnila, in columns 4-5 lines 57-30 and Figures 5-6, teaches a SOI substrate wherein thinning is performed up to the insulating layer.

The Examiner notes that Applicant's specification contains no disclosure of either the critical nature of the claimed process or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen processes or upon another variable recited in a claim, the Applicant must show that the chosen processes are critical. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990).

**Claim 9**

Finnila teaches vertically integratable circuits having electrically conductive contacts for electrically conductive connection with further vertically integratable circuits

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comprising electrically conductive contacts used for vertical integration and associated insulations. (See columns 3-5 and Figures 1-7). The Examiner notes that the patentability of a product does not depend on its method of production, therefore, the limitation "produced simultaneously during production of the vertically integratable circuit itself", is given no patentable weight.

"Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

A "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

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Claim 10

Incorporating all arguments of Claim 9 and noting that Finnila, in Figure 7 shows multiple vertically integratable circuits wherein electrically conductive contacts are connected with each other.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over 5,426,072 to Finnila in view of Silicon Processing for the VLSI Era (2000), volume 1, to Wolf et al.

Incorporating all arguments of Claims 1 and 2 and noting that Finnila fails to explicitly teach wherein the field oxide is produced in a region of the substrate where gaps in the substrate material are completely oxidized.

However, Wolf et al., on pages 268-269, teaches the Deal and Grove model of silicon consumption versus the amount of final oxide thickness. Further, the Deal and Grove model teaches that a finitely thick quantity of silicon can be completely oxidized. Furthermore, Finnila, in column 3 lines 50-55, teaches forming interconnects in both active regions and field regions so as to provide optimum vertical interconnect placement flexibility.

It would have been obvious to one of ordinary skill in the art to modify Finnila by incorporating a field oxide that is produced in a region of the substrate where gaps in



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the substrate material are completely oxidized, as taught by Wolf et al., to provide optimum vertical interconnect placement flexibility.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over 5,426,072 to Finnila in view of Semiconductor Manufacturing Technology (2001) to Quirk et al.

Incorporating all arguments of Claims 1 and 2 and noting that Finnila fails to explicitly teach wherein the gaps filled with electroconductive material are performed during production of a metallization level.

However, Quirk et al., on page 301 teaches a copper metallization micrograph courtesy of Integrated Circuit Engineering wherein the vertical interconnects are filled during production of a metallization level. Furthermore, Quirk et al. shows that metallization levels allow for a myriad of possible contacts between successive layers.

It would have been obvious to one of ordinary skill in the art to modify Finnila by incorporating vertical interconnects filled during production of a metallization level, as taught by Quirk et al., to allow for a myriad of possible contact points between successive layers.

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**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Hogans whose telephone number is (703) 305-3361. The examiner can normally be reached on M-F (7:30-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

dh 

May 4, 2003

  
CARL WHITEHEAD, JR.  
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